REMARKS

Applicants have carefully considered the Office Action dated August 2, 2004 regarding the above-identified application. The amendments above together with the accompanying replacement drawing sheet and the comments that follow are presented in a bona fide effort to respond and address all issues raised in that Action. Prompt favorable reconsideration of this amended application is requested.

A new drawing sheet is presented herewith, to change 'Binarization' to 'Digitization' in Fig. 13. This correction should overcome the objection to the drawings. Applicants have amended the text of the abstract and of various paragraphs in the description, essentially as suggested in the objection to the specification. Withdrawal of the objection to the specification is requested. The description on pages 18 and 19 of the application also has been revised, to conform the reference numeral usage to the numbers actually appearing in Fig. 10. In amending the drawing figure and revising the specification, care has been taken to avoid entry of new matter. It is submitted that the description, abstract and drawings now meet all applicable formal requirements and all of the objections thereto should be withdrawn.

Section 4 of the Office Action included a series of objections, essentially suggesting revisions to the language of the claims. Applicants have revised the claims per these suggestions. However, since these revisions were for purposes of overcoming purely formal objections, it is submitted that the reason for these changes was not related to patentability and that none of these amendments narrow claim scope. It is requested that the Examiner withdraw the objection to the claims.

Applicants note with appreciation that the Examiner indicated that claim 8 would be allowable if recast in independent form. Applicants have amended claim 8 to incorporate the

original language of claim 1 (with the changes to address the formal objection) and thereby recast claim 8 in independent form while preserving its original scope. It is respectfully submitted that amended claim 8 is allowable as suggested by the Examiner.

Claim 1 also has been amended to indicate that "the synchronization is realized by sampling data at the point of 1/2 clock cycle different from the zero-crossing point of the signal." As will be discussed more below, it is submitted that this amendment helps distinguish other remaining claims over applied prior art.

The rejections are addressed in detail below.

The Enablement Issue

The Action rejected claims 3, 4 and 7 under the first paragraph of 35 U.S.C. §112 for alleged lack of an enabling disclosure. Claim 7 has been cancelled to reduce issues. However, this rejection is traversed with respect to claims 3 and 4. Claims 3 and 4 recite different characteristic changes based on certain values "immediately before" a sign change. The rejection for alleged lack of enabling support is based on an assertion that characteristic change based on values immediately before sign change has not been described. Applicants respectfully traverse.

The equalization characteristic change using an output value and a reference value after change of the sign of output of the adaptive equalizer circuit is disclosed in the explanation of Fig. 12 (page 18, line 3 p page 20, line 11). For example, the text in lines 21-25 of page 18 originally read "Here, although the sign of the data 901 is judged as negative, data 904 which precedes the data 901 by one clock cycle by means of a unit delay circuit DCZ is inputted to the subtraction circuit 204 which computes the equalization error." Recognizing that there may have been some confusion, because 900 series numbers did not appear in the relevant drawings, this text has been

revised to refer to the 1000 series numbers indicting the signal points in the diagram of Fig. 10. As revised, the text now reads "Here, although the sign of the data 901 is judged as negative, data ~~904~~ 1004 which precedes the data ~~901~~ 1001 by one clock cycle by means of a unit delay circuit DCZ is inputted to the subtraction circuit 204 which computes the equalization error." Point 1005 is clearly shown as a point before zero crossing (sign change) in Fig. 10. As stated, the subtraction circuit 204 computes the equalization error based on data 1005 that precedes the data point 1001, and thus on data that precedes the sign change.

Further, the text running from page 22, line 21, to page 25, line 6, refers to coefficient updating "**before** and after the zero-crossing."

Applicants respectfully submit that the cited disclosure provides enabling support for the subject matter of claims 3 and 4. Withdrawal of the rejection under the first paragraph of 35 U.S.C. §112 is requested. Since there was no other rejection of these two claims, claims 3 and 4 should be in condition for allowance.

Patentability of Other Claims

Claims 1, 2, 5, 6 and 9 stand rejected under 35 U.S.C. §103 as unpatentable over U.S. Patent No. 5,768,313 to Kuribayashi in combination with U.S. Patent No. 6,414,990 to Jonsson et al. (hereinafter Jonsson). Claim 1 has been amended to recite that the synchronization is realized by sampling data at the point of 1/2 clock cycle different from the zero-crossing point of the signal. Claims 2, 5, 6 and 9 depend from claim 1 and therefore incorporate this added recitation. It is respectfully submitted that the combination of Kuribayashi and Jonsson does not meet all of the requirements of these amended claims, and as a result, the combination does not render any of these rejected claims unpatentable.

The subject matter of claim 1 relates to an adaptive equalizer wherein the arithmetic operation of the adaptive equalizer circuit is performed in synchronization with a signal having a phase different from the reference clock signal of the signal by a 1/2 clock cycle. The sampling of data to provide synchronization occurs at the point of 1/2 clock cycle (-T/2, T/2 ...) different from the zero-crossing point of the signal. This sampling technique improves the equalization characteristics in comparison with an adaptive equalizer sampling data at the point of reference signal (-T, T...).

It may help to consider some drawings that Applicants have developed to illustrate their understanding of Jonsson and this point of distinction. Fig. A below shows the timing of the sampling in accord with the "present invention" of amended independent claim 1. As shown in Fig. A below, the sampling occurs at the point of 1/2 clock cycle (-T/2, T/2 ...) different from the zero-crossing point of the signal. As a result, the error at the time of sampling is relatively small.

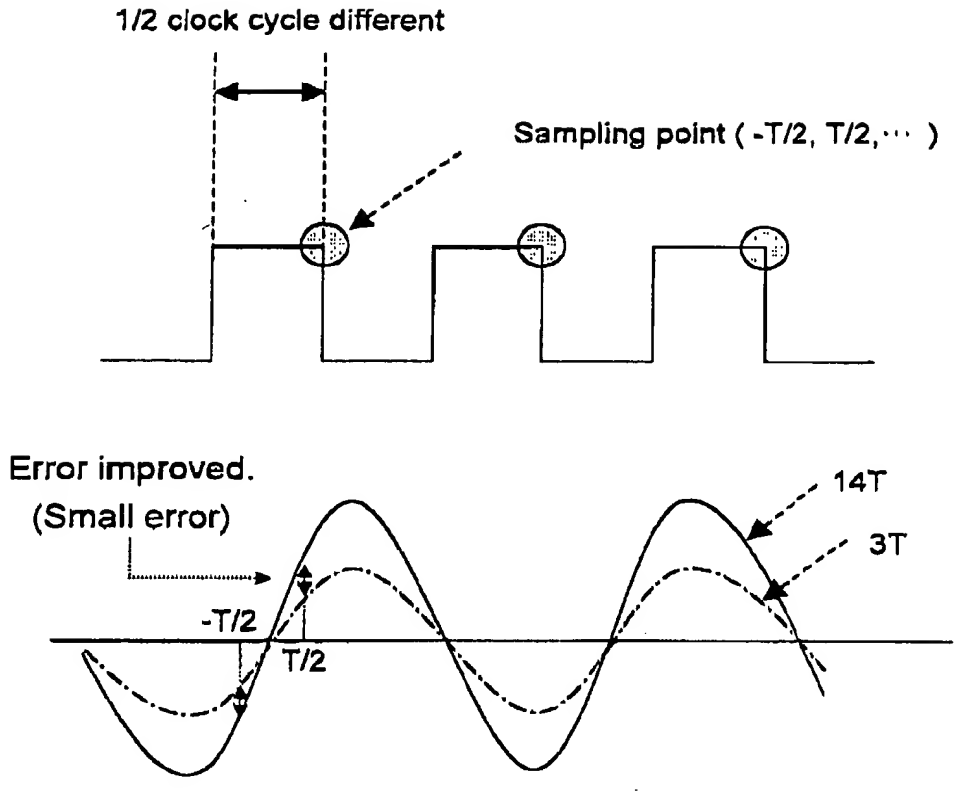

Fig A. The present invention

For comparison purposes, Fig. B below shows Applicants' understanding of the sample timing in Jonsson.

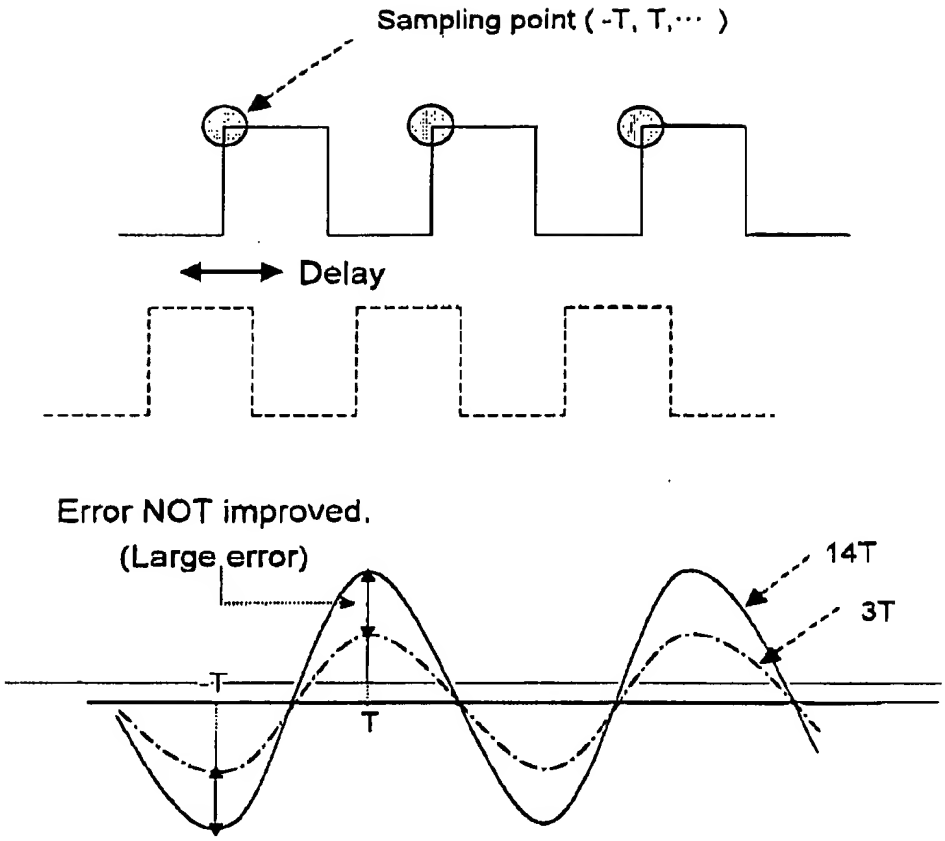

Fig B. Jonsson

It is respectfully submitted that there is no disclosure of sampling data at a point 1/2 clock cycle different from the zero-crossing point of the signal, in either of the applied patents. As the Examiner recognized in the Office Action, Kuribayashi does not disclose even that the equalizer's arithmetic operation is "synchronous with a signal having a phase different from the reference clock signal of the signal by a 1/2 clock cycle." Jonsson was cited for synchronous sampling. However, Jonsson does not disclose the feature of "sampling data at the point of 1/2 clock cycle different from the zero-crossing point of the signal."

As shown in Fig. B, Jonsson discloses an adaptive equalizer sampling data only at the point of –T, 0, T..., and the error between 3T and 14T is relatively large (not improved). This is because Jonsson specifically relates to a digital data communication system and it is only for the phase

adjustment. Hence, in Jonsson there is no need/disclosure for sampling data at the point of 1/2 clock cycle (-T/2, T/2...) for improving operation of the equalizer. Even if Jonsson discloses using a delayed clock cycle, the sampling point is always just the point of reference signal, not the point of delayed cycle point. Also, the meaning of "delayed clock cycle" disclosed in Jonsson is different from that of the present invention. (See Fig. B) Further, the Jonsson device can sample only at the point of the reference signal for the phase adjustment.

Therefore, it is submitted that even if Kuribayashi and Jonsson area combined, the combination would not provide the synchronous arithmetic operation achieved by sampling data at the point of 1/2 clock cycle different from the zero-crossing point of the signal, as claimed. Since the combination does not satisfy all the limitations of independent claim 1, claim 1 and dependent claims 2, 5, 6 and 9 patentably distinguish over the applied combination of patents. The art rejection therefore should be withdrawn, and claims 1, 2, 5, 6 and 9 should be allowable over the art of record.

Conclusions

The drawings, description, abstract and claims have been amended to address all formal objections. Claim 8, now recast in independent form, should be allowable as indicated in the Office Action. Claim 7 has been cancelled, and it is believed that claims 3 and 4 are adequately supported by the disclosure. Hence, the rejection for lack of enablement should be withdrawn. It is respectfully submitted that claims 1, 2, 5, 6 and 9 patentably distinguish over the applied prior patents and should be patentable. The present application therefore should be in good order and in condition for allowance. Prompt favorable reconsideration is solicited.

It is believed that this response addresses all issues raised in the August 2, 2004 Office Action. However, if any further issue should arise that may be addressed in an interview or an Examiner's amendment, it is requested that the Examiner telephone Applicants' representative at the number shown below.

To the extent necessary, if any, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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